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ABSTRACT

The unit provides information on the study of the human brain for students in grades 5-9 with suggestions for extending the lessons for gifted and talented students. Learning activities are offered for ten lessons (sample subtopics in parentheses); introduction to the unit (student pretest and posttest); brain growth; medulla-oblongata-reptilian brain; cerebellum-lumbic brain; cerebrum-neocortex-new mammalian brain; hemisphericity (the mind's dual nature, styles of learning and thinking); the hemispheres (right brain and left brain functions in terms of styles of learning and thinking); the senses; long and short term memory; and the positive potential of the brain. Extended learning activities require higher level thinking on topics such as dreams, extra sensory perception, the biochemistry of emotions, and phobias. This document is part of a collection of materials from the Iowa Area Education Agency 7 Teacher Center Project. (CL)

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Reflections . . .

My interest in the brain began after almost eight years of teaching. As the adage expresses, "If only I knew then what I know now! However, I am grateful for being enlightened and owe a great deal to Susan Kovalih, who first impressed upon me the need to know the brain and to share its beauties with our children.

In order to realize our potential, we must first have an understanding of our capabilities. The purpose of this unit is to explore the brain's capabilities. After the unit is completed and throughout the years, I hope the children of your classes will be more knowledgeable of their abilities and will strive to achieve their goals.

Finally, I challenge you, the teacher, to spread the word and encourage your colleagues to learn and teach about the brain. Appropriately, it has been referred to as the last frontier. Please join in this exciting exploration of the magnificient mind, the beautiful brain. You will teasure the knowledge throughout your life.

Nancy Grimes Struve

Lesson 1

INTRODUCTION TO THE UNIT

Introduce the students to the study of the human brain. It is important for the students to realize that this topic is so necessary to their well being. The brain is the center of each of us--our thoughts, emotions, ideas, a computer, a creator, a problem solver, a dreamer. To know more about the brain is to know more about yourself, your potential and the beauty of your marvelous mind.

A preview of what will be covered in this unit:

A. Anatomical Parts

B. Physiological Functions

C. Right and Left Hemispheric Characteristics (Teacher will probably need to explain that the cerebrum/neocortex is composed of two parts, hence, hemi-spheres.)

D. Role of the Senses as Information Gatherers

E. The Memory

F. Value of the Human Brain and Why it Separates us from all Other Living Creatures

At this point the pretest should be administered. Students should be told that it will be used to assess what they already know and don't know about the brain. At the end of the unit, a post test will be given to assess what they have learned.

Either in small or large groups, have students list responses to the question, "What different names or descriptions are commonly associated with the brain?" After five or six minutes share the responses and compile a list either on the chalkboard or on an overhead transparency. Analyze the responses. Indicate those seemingly negative with a minus sign, those positive with a plus sign. Total and compare the results. Were they surprising? If there were more negatives, have students offer suggestions as to why this might be. If more positive, do the same. (Past experience has tended to result in more negative terms, i.e. scatter brained, bird brain) Suggest if not in student responses, that one reason might be due to our own ignorance and lack of knowledge about the brain. Traditionally, the brain has not been given a "fair shake" in our beliefs, customs, and stereotypes.

LESSON 1

The brain is responsible for our basic functions and has so many capabilities. In order to expose students to the vast potential of the brain, plan a quiet session where students can browse through books, pamphlets, and magazine articles all about the brain and its related functions. A classroom collection of materials will be helpful throughout this unit. Amass at least thirty items about topics such as the brain, ESP, dreams, the senses, current research on the mind, effects of drugs and certain foods, etc. The media specialist should be able to help you locate materials. Current magazines often have interesting articles so you will want to include specific issues of Science Digest, Psychology Today, Science 81. Odyssey, Omni, Discover, and Reader's Digest.

Distribute the materials among the students. Allow a browsing time of two-three minutes then the students should exchange materials. Allow this activity to continue until students have seen five or six different items. (You might want to repeat this activity throughout the unit.)

After the browsing session, students should have exposure to a visual of the brain. If possible, I recommend purchasing animal brains for students to examine and dissect. Many grocery stores will order pig or cow brains if given advance notice. If real specimens are not attainable, a model or chart may be used to introduce the following activity on basic facts about the brain.

The teacher can use the following sheets as a source of information and develop discussion questions, i.e. How much do you think the average brain weighs? What does it need in order to survive? How much of your body's total blood and oxygen does the brain use? As you progress through the facts, you may have to inform the students, particularly if the questions become difficult to formulate and if you think the students would not know the answers. You may want to edit or modify this list and use as a handout for the children.

I suggest you put up a chart or bulletin board and encourage students to research and find more facts to add to the list throughout the unit. Spend a few minutes reviewing the additions.

If time permits, conclude the lesson with the class again listing terms and descriptors for the brain. Encourage them to create their own phrases describing their reactions based on what they have learned today, i.e. Wow!!, What a storehouse, Amazing, That's really me?????

STUDENT PRETEST & POST TEST

(Objective questions)

1. List six facts about the brain's functions.

2. When does the brain reach its maximum growth?

3. Name the three major sections of the brain. Also, list their counter-terms.

4. List four functions for each of the three main parts of the brain.

5. Identify the four lobes found in both brain hemispheres.

6. List five specific functions of the left hemisphere and five functions of the right hemisphere.

7. Which hemisphere might be dominant with each of the following careers.

   Mathematician

   Poet

   Song writer

   Author

   Chemist

8. What is the primary purpose of the five major senses?

9. What is meant by the phrase, the dominent sense?

10. Name the two types of memory systems.

(Subjective questions)

A. What is the purpose of learning about the brain?

B. What is the meaning of the phrase, the brain--the last frontier?

C. (Pretest item) What do you hope to gain from this unit?

D. (Post test item) What did you gain from this unit?

BRAIN FACTS
or
Things you may not have known about your brain
but do now which results in an astonishing
admiration and appreciation for the
mass at the top of you!

Average weight is 3 pounds, roughly 2% of total body weight.

Consumes 20% of all the oxygen and 25% of your body's blood, 1½ pints/minute.

Is bombarded with over 10,000 stimuli per second.

Generates about 25 watts of electricity, no "charge"!

Uses 100 times more connections than the telephone system . . . and does a better job than Ma Bell, no charge.

Average person uses 10-12% of brain, remaining 88-90% is available so let's try harder.

Born with all the brain cells you'll ever have, 10-12 billion--roughly as many as stars in the Milky Way.

5/6 of the brain growth occurs after birth. Seems to grow in five stages and is usually completed by fourteen years.

Stages:
3 - 10 months
2 - 4 years
6 - 8 years
10 - 12 years -- (No wonder adolescence and
14 - 16 years -- puberty is rough! The brain is growing, mind's a changing, values being tried and tested.)

It's possible (but not common) for the brain to experience 40 months of emotional growth in just one year. What a change in personality!

Composed of medulla, cerebellum and cerebrum. If the cerebrum was spread out on a kitchen size table, it would only be 1/4" thick, yet this part is 80% of your brain. Due to the many dips and folds, it fits inside the skull. Hat makers are thankful.

Is made of neuron (nerve) and glial cells, Glial--derived from Latin, meaning glue. One purpose of glial cells is to hold your brains together. Glial--the super glue of nature!

Kids and their brains know between 60,000 - 80,000 words, some we wish they didn't know.

The brain feels no pain.

The optic nerve is an extension of the brain.

Can charge an emotion into a physical property. Known as the biochemistry of emotions. When feeling sad, you might cry. When feeling ecstatic, you might cry. A humorous thought can make the diaphragm flutter--laughter. Extremely humorous situation can lead to physical effect which may lead to embarrassment--involves the urinary tract. Use your imagination--right hemisphere.

Your brain is actually divided into two hemispheres, connected by a nerve, the corpus callosum, which is the last leg of the spinal chord.

Neuropsychologists (in several countries) believe that the right hemisphere is involved with negative feelings and expressions while the left side is associated with positive feelings and expressions. So put on a happy left face!

Brain research theorizes that part of the brain is reptilian-like by nature. This innermost brain is responsible for routines, instinctive behavior, territorialism, self-preservation, to mention a few of its functions.

The earliest part of the human fetal brain to begin functioning is the vestibular system which is responsible for sending impulses important in co-ordination. Coaches should be proud of that fact!

Science has recognized psychobiology as the study of the physical brain. Scientific procedure is applied to the understanding of the processes of the brain.

The human brain is the most complex organism known to exist in this universe. It is perhaps too complex to ever completely understand itself???

For teacher use; may want to edit or distribute as is to students.

Lesson 2

BRAIN GROWTH AND INTRODUCTION TO MAJOR AREAS

Like the body, the brain continues to grow after birth. There is a definite similar pattern of growth between the two; and in most cases, both the brain and physique reach full growth in the teen years. (Males have more tendencies to continue physical growth even into the early twenties.)

Once grown, the brain continues to expand in potential, capability and abilities. The old adage that you're never too old to learn is so true of the magnificent brain. Perhaps this truth can best be understood by exploring the tremendous gains in knowledge and ability during the brain's phases of growth, otherwise known as spurts.

When beginning at the stage of birth-two years, it would be helpful to have students think of younger brothers/sisters; nieces/nephews; neighborhood children; friends of family; perhaps children they babysit. As you progress through stages, students should be better able to relate to the development of the brain. The in-between years are considered plateau periods, a time for the brain to rest and adjust.

Unborn

As early as 16 weeks, the vestibular system of the brain is operating. Presently, known to be the earliest function of the human brain, this system is responsible for transmitting the impulses important in co-ordination. The fetus begins to register its earliest perceptions.

During 28-32 weeks, the cerebral cortex establishes its pattern of nerve-cell connections.

Science is far from knowing specific brain development in the unborn. The use of ultra sound and sonar devices have, however, enabled psychobiologists to learn more by observing fetal behavior and reaction to its environment.

Only 1/6 of the brain's growth is completed by birth. The remaining growth occurs in spurts or stages.

After Birth

Examine each stage by soliciting examples of learning that accompanies each level.

Birth-2 years. Examples: creeping, crawling, sleep patterns, sounds, associations with significant others, looks with hearing, seeing with grasping, reach out, simple understanding of symbols/signs (waving bye-bye), talking, walking, self-feeding, recognition of toys, memory, emotions.

2-4 years. Significant increase in comprehension, word usage-simple sentences, learning games, curiosity, psychomotor coordination (catching balls), dressing self, understanding rules, alphabet, numbers, colors.

6-8 years. Formal schooling begins (reading, math, etc.), responsibility, socialization skills increase.

10-12 years. School related learning, preferences and interests continue to grow, puberty starting.

14-16 years. Major change--puberty, brain releases chemicals signalling physical changes, mental and emotional changes --lose of "childhood".

Major Areas

The brain is a mass of many parts with a multitude of abilities and specialized functions. This lesson introduces the three main "brains" and their locations. Since these parts are equally important, they are treated as separate, unique brains. Dr. Paul McLean, a noted brain research scientist, refers to the total as the "triune" brain; tri meaning three. (Dr. McLean is associated with the National Institute of Mental Health.)

Transparency is needed of The Triune Brain. A copy is included at the end of this lesson.

The brain is actually examined in sections. While three terms; medulla oblongata, cerebellum, cerebrum, might be most familiar, the other terms will become common throughout the following lessons.

Medulla Oblongata and Pons are positioned at the base and stem of the brain. This area is also referred to as the Reptilian brain. This center of our brain is responsible for self-preservation.

The cerebellum and limbic system, although in two different locations, are within the same cross-section. The cerebellum is responsible for muscle co-ordination and, like the limbic system, is also involved in our emotional behavior.

The outer, massive brain is the cerebrum, also known as the neocortex and the new mammalian. It is the most recent brain structure in the human species and is responsible for our highly developed intellectual and creative abilities.

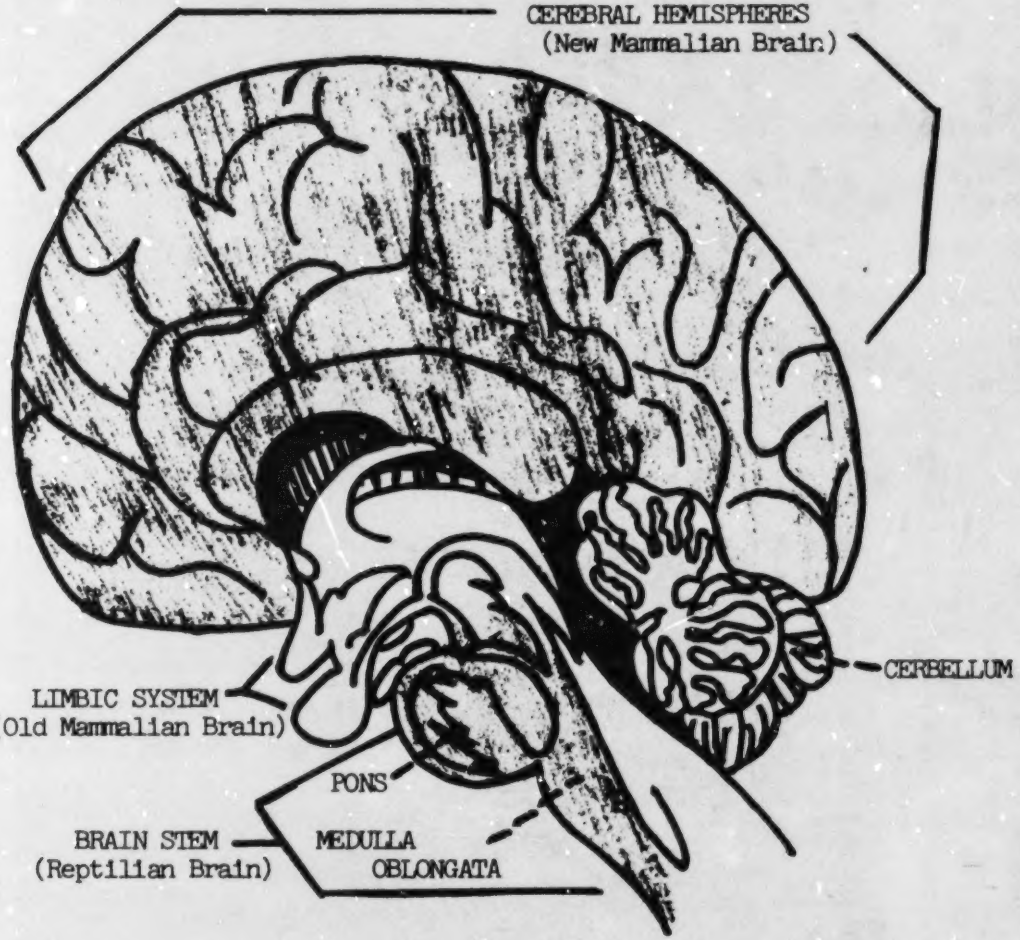
The three brains function as separate units, yet as a whole. As Dr. Paul McLean emphasizes, "The three brains amount to three interconnected biological computers, each having its own intelligence, its own subjectivity, its own sense of time and space, and its own memory and other functions."* (Teachers may want to make a transparency of this quote.)

Thoughtful closing--

Have students quickly brainstorm other devices, machines, objects, etc. where units perform separately yet together as a whole. Examples: the human body organs, a family, a group of assembly factory workers, parts within a car. . .

*Restak, Richard. The Brain: The Last Frontier, Warner Books, 1979, p. 52.

THE TRIUNE BRAIN



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Lesson 3

MEDULLA OBLONGATA - REPTILIAN BRAIN

Begin this lesson with a discussion of the term reptilian. What does it mean? (of or like a reptile.) You may want to solicit examples of reptiles. Why do you suppose it has been called the reptilian brain? (The functions are similar to the basic functions of a reptile's brain.) Considering the reptiles you know or have studied, what would be the basic functions of their brains? (Foraging for food, defending against enemies, continuing the species, controls basic functions of breathing, movement, blinking, heartbeat, etc.)

A closer look at the specific functions of this brain: This information will serve as the basis for discussion. It is suggested that the teacher prepare a student handout or use a transparency of the following characteristics.

Most ancient part of our brain

First layer and the center of the brain

Liking of "home" and the familiar places of residence, work and the way we socialize; center of our development of habits, imitation of fads and fashions

Controls involuntary reflexes of the body-Ask students to list these. (Swallowing, coughing, blinking, salivating, breathing, the heartbeat, hiccuping, etc.)

Insistence on routine, repetition. We all have developed our own patterns and routines. For example, examine your morning routine Monday through Friday before you get to school. Write down the steps you take from getting up to being on the way to school. If there is a variance, what factors influence a change? (i.e. Perhaps a phone call, someone else does something to disrupt your routine, perhaps one morning there is a music lesson or special practice, or you might rise earlier to study for a test. etc.) Without these changing factors, is your pattern fairly routine? How do you feel when your routine is disrupted? How easily can we learn a new routine? If anyone has recently moved, their routine probably changed. If a parent started working or the student was in a new car pool, changes occur. Consider the

different school years and schedules. We all adapt. Do you have routines established concerning feeding times? Discuss by sharing examples. This part of the brain is very flexible yet will assuridly afix a new routine!

Territorialism-private space. Territorialism is our need for private space. What an interesting phenomena to observe! Explain the concept with the following examples or choose some of your own.

a. In the animal domain, territorialism is essential to survival. Animals use their scents to establish their home, foraging and living domain. This need is so instinctive that it is still commonly seen. Whenever a dog "marks" a tree or the corners of his backyard, he is naturally claiming his territory.

b. A very common site of this phenomena in people is in church. Typically, people establish their special pews although no seating chart is ever made. "Invasion" of a family's territory may cause unrest although the family will probably not say anything and sit elsewhere. However, they will attempt to reclaim their territory the following Sunday.

Obedience to precedent and ritual. Holidays and special occassions are usually celebrated in a traditional way by each family. Small customs and methods of doing things are established by precedent. In the bird kingdom, many species have certain rituals preceding the selection of a mate.

Mating functions.

Formation of social hierarchies or a pecking order. This is especially studied in a flock of chickens. Also, this behavior can be observed in the social hierarchy of humans. Membership in certain clubs or groups may be preferable over others simply because some groups are regarded as socially higher or more advantageous. Cliques within a classroom or school are also examples of a social hierarchy.

Awe for authority

Mechanisms for aggression; violent, unthinking behavior. When provoked an animal (and some people) will respond with unthinking, violent behavior.

Direct the students to choose one of the characteristics and write a short paper relating an activity, behavior or observance in their life that relates to the function of the reptilian brain.

Lesson 4

CEREBELLUM-LIMBIC BRAIN

Divide the class into five groups. Each group will need a recorder. Every group will be given a card with letters of the alphabet (see below). Give the students five minutes to brainstorm types of emotions and feelings that begin with those letters. You might wish to extend the brainstorming session depending on student response and ability to quickly list.

afkpv bglqr chmsw dinty ejouz

After brainstorming, go through the alphabet in order and have the group give two examples for each letter. If there has been no response to a letter, such as q, solicit from the whole class. (quiet, queezy)

The purpose of this exercise is to begin to comprehend that the human mind is capable of a multitude of feelings and emotions. Scientists believe the center of emotions lies within the cerebellum and limbic systems. Although this is a key function, these brains also control many other aspects of human behavior.

As mentioned in the second lesson, the cerebellum is responsible for coordination of the body's movements. Whenever a person reaches for a bottle of pop and takes a sip, the cerebellum is coordinating this smooth-flowing motion.

The cerebellum may serve as the regulating mechanism for sensory-emotional processes. Closely related is the limbic brain, also known as the old mammalian. Many of the functions are also observable in mammals, although not necessarily to the same degree as in humans. Besides being a control agent of emotions, other functions are:

regulates smell and taste

sense of balance, time, comfort and discomfort

guides behavior required for survival, i.e. feeding, fighting, fleeing

thought to be the center of emotions

switches on different organs and glands as needed

guides behavior for reproduction

love and care of young-bonding, so vital in the parent-child relationship

sense of family feeling and affiliation

center of playful behavior

contributes to a sense of personal identity

Return to the list of emotions. Have each group choose one emotion and pantamime the feeling. The rest of the class will try to guess which emotion is being portrayed. (Allow students a reasonable amount of time to plan their skit.)

Lesson 5

CEREBRUM-NEOCORTEX-NEW MAMMALIAN

"What's in a name"? All three of these terms (cerebrum, neocortex, new mammalian) refer to the same section of your brain. By discussing these meanings, you should have a clearer understanding of this most magnificent part of your mind.

Cerebrum is a Latin word which directly refers to the upper, main part of the brain. In man, it is the largest part and controls the conscious and voluntary processes.

Neo is a prefix meaning new, recent or latest. Cortex refers to the outer part or external layers of gray matter over most of the brain. In the development of the human species, the neocortex, then is the most recent brain structure. This is a highly developed complex of nerve cells that produces language and allows us to perform intellectual tasks.

New Mammalian is a term used to identify this same section of the brain which is highly developed in primates (mammals, too) but is most complex in the human species. Therefore, this brain is not found in reptiles nor in some mammals.

The enormous capability of the neocortex perhaps can best be realized by discussing the meaning of the following comparison of the complexity of the three brains.

> The reptilian is to a pocket dictionary as the limbic is to a multi-volume encyclopedia as the neocortex is to the New York Public Library! (Leslie A. Hart)

The cerebrum/neocortex is only 1/10-inch thick, however, it is so deeply folded and wrinkled that it takes up the most space in the cranium. This brain is divided into two spheres, referred to as the right and left hemispheres. Connecting the two is a large bridge of nerve tissue known as the corpus callosum. Both hemispheres are further divided into four lobes, each responsible for separate functions. These are the frontal, temporal, parietal, and occipital lobes. Although the processes are quite complex, a short summation will serve to give students a reference point of location and function. It is suggested that the teacher locate a picture or model showing the lobes.

The frontal lobe is located directly behind the forehead. Thoughts of the future, making plans and control over most of the speaking muscles are all centered here.

Just above the ears is the location of the temporal lobes. These lobes are very important since they control hearing, memory, and speech. The parietal lobes which form part of the top and sides of the skull also appear to have control over speech and memory. Finally, the occipital lobes, located in the back of the head, serve to make sense out of what you see.

*If student interest warrants further investigation of the lobes, an entended session or student research would be worthwhile.

The dual world of the hemispheres is a fascinating study. Each hemisphere is specialized for a different cognitive style. The left processes information in linear, sequential, and logical modes. The right hemisphere processes information in holistic, non-linear and creative modes. In order for students to understand this major difference, a vocabulary study of the underlined words is essential. It is suggested that the students define the words then, as a class, discuss meanings and give examples.

Cognitive/Cognition. The process of knowing, including perception, memory, judgment etc.

Linear. Having an effect or giving a response directly related to a stimulus. If x happens, y is the result.

Sequential. Forming a regular sequence of parts.

Logical. Necessary or to be expected because of what has gone before, reasonable.

Holistic. The whole of, greater than the sum of the parts. Example, day is not the opposite of night but rather together these parts with dawn, betweens, and dusk form a cycle, a holistic period.

Non-linear. Not directly related.

Creative. Having or showing imagination, artistic or intellectual inventiveness.

Since these terms will be used frequently in the next two sessions on hemisphericity, students should become familiar with the terms. Word games, such as the following, will aid in recognition.

*These activities could be produced by children for a weekend assignment and presented to each other during the second week of the unit.

A. Word Jumbles

nerlia	shocliit	tiqesuneal	laolicg
ravaitcee	orilnnane	igotvncei	

B. Devise (or have a student) a scrambled word find. Words may be written forward, backwards, diagonally up or down.

C. Have students develop daffynitions for each term. Example, an entire inventory of clock noise=

ho	+	lis	+	tic
whole- entire		list- inventory		tick clock noise

You may want to include other terms for review--hemisphere, cerebrum, cerebellum, medulla, limbic (tree aerobics= limbics), etc.

Allow the children to use their right brains in creative, imaginative modes to develop daffynitions.

Lesson 6

HEMISPHERICITY

Begin this session by reviewing information on the cerebellum/neocortex in the previous lesson. Review the introductory material on hemisphericity.

Various studies have provided evidence for hemispheric specialization. In simpler terms, each half seems to be responsible for specific functions of the brain/mind. For centuries, the dual nature of the mind has been suspect. Many have given greater importance to the left and its functions and have too often regarded the right as mysterious. More recent research has finally brought the right brain "out of the closet" and recognizes that it too, is highly specialized. Since our Western culture necessitates more use of the left, those socialized and enculturated in the "Western"-American style have, perhaps, made lesser use of the functions and benefits of the right mode.

The sheet titled, "The Mind's Dual Nature" is a good summary of previous perceptions of the two minds. As cited, most of the information was taken from Samples' book. The remaining additions were found in various sources. The left column indicates the source of belief, the middle refers to the left side and the right column to the right side of the brain.

Admittedly, most students will not recognize many of these sources. Obviously some of the terms will be new and unknown. The listing may serve as the launching of a research assignment. Individually or in groups, the examples could be researched by the class. Biographical identification of the source, definitions of the terms, followed by student/class analysis of the relationship, would certainly make the material more meaningful. Teachers of younger grades may wish to shorten the list.

THE MIND'S DUAL NATURE. . . . . .

Proposed by	Left Side of Brain	Right Side of Brain
Many sources	Day	Night
Blackburn	Intellectual	Sensuous
Oppenheimer	Time, History	Eternity, Timelessness
Deikman	Active	Receptive
Polanyi	Explicit	Tacit
Levy, Sperry	Analytic	Gestalt
Domhoff	Right (side of body)	Left (side of body)
Many sources	Left hemisphere	Right hemisphere
Bogen	Propositional	Appositional
Lee	Lineal	Nonlineal
Luria	Sequential	Simultaneous
Semmes	Focal	Diffuse
I Ching	The Creative: heaven masculine, Yang	The Receptive; earth feminine, Yin
I Ching	Light	Dark
I Ching	Time	Space
Many sources	Intellectual	Intuitive
Many sources	Verbal	Spatial
Vedanta	Buddhi	Manas
Jung	Causal	Acausal
Bacon	Argument	Experience
Freud	Secondary Process	Primary Process
Piaget	Primary symbolism	Secondary symbolism
Piaget	Accommodation	Assimilation
Schactel	Conventionalized experience	Trans-schematic experience
Maslow	A Cognition	B Cognition
Taylor	Convergent thinking	Divergent thinking
Langer	Discursive symbolism	Presentational symbolization
Polanyi	Focal Awareness	Subsidiary Awareness
Neisser	Sequential processing	Multiple processing
Kubie	Conscious processing	Preconscious processing
Wertheimer	Productive thinking	Blind thinking
Bleuler	Realistic thinking	Autistic thinking
Many sources	Public knowledge	Private knowledge
Many sources	Literal meaning	Metaphorical meaning

Samples, Bob. The Metaphoric Mind; A Celebration of Creative Consciousness

additions . . .

Bruner	Rational	Metaphoric
Schopenhaurer	Objective	Subjective
Maslow	Rational	Intuitive
Ornstein	Analytic	Holistic

Before examining the characteristics of functions for each hemisphere, it is important that the students understand that the two brains do not always function separately nor is a specific function always totally controlled by one sphere. Research by McCallum and Glynn (see bibliography) indicates that both have the potential to generate and create new ideas. For example, both can produce creative thoughts and, furthermore, do interact to produce creative products. Many researchers believe that a physiological harmony is achieved when the minds are interacting. This idea reinforces the significance of each sphere and tends to indicate that resulting achievement will be more satisfactory if both spheres are interacting.

(To educators these findings imply that students need to experience the use of both modes. A quick review of the functions of the left sphere should reveal that most of what students experience in school requires use of the left mode. If a child is dominant in right brain ability, she/he may experience difficulties in the left-brain oriented curriculum. Teachers are encouraged to think about their students and provide activities and opportunities that stimulate both left and right brain usage in every curriculum.)

The following "test" of brain dominance can be administered to the children. Two versions are included, one of which has been abbreviated and used with fourth and fifth graders. When I first received a copy of this inventory, it was still in the developmental stages and compiled by E. Paul Torrance. As of this writing, I am not sure if it has been copyrighted. Even though I have seen it included in publications, legal verification of this point has not been made. If you, the teacher, decide to use it, you will assume responsibility. Admittedly, it is an interesting instrument and one that children enjoy completing. Although it can be scored and conclusions of dominance can be drawn, I have yet to see research documenting the validity of its intent. For practical purposes, the instrument should be treated as an indicator of preference but not as a final, absolute determiner of an individual's dominance.

The first example is the abbreviated version and contains only twenty-three items. The full inventory has fifty items. The scoring key indicates which response per question indicates right, left, or integrated preference. In order to score the shorter version, the corresponding question on the long form must be found. For example, item four, short form is actually item seven on the long, therefore, the appropriate interpretation of R-L-I would be number seven on the key. Teachers need simply to make another scoring key if the abbreviated version is to be used.

YOUR STYLE OF LEARNING AND THINKING

(abbreviated version)

Name _____

INSTRUCTIONS: Read each question very carefully, think about yourself, then circle the appropriate response that best describes your strengths and preferences as accurately as possible.

1. a read for main ideas
   b read for specific details and facts
   c read for main ideas and for details and facts equally

2. a never forget a face
   b never forget a name
   c never forget a name or face

3. a usually learn or remember only those things that I study
   b good memory for details and facts in the environment not necessarily studied
   c have noticed no difference in my abilities in these areas

4. a would rather write a fiction book
   b would like to write a non-fiction book
   c no preference between writing fiction and non-fiction

5. a like to read fantasy stories
   b like to read realistic stories
   c no preference between fantasy and realistic stories

6. a equally as much fun to dream as to plan realistically
   b more fun to dream
   c more fun to plan realistically

7. a listen to music or television while reading or studying
   b must have total quiet in order to read or study
   c listen to music or television only if reading for enjoyment, not if studying

8. a have no preference between poetry and prose
   b prefer reading poetry to prose
   c prefer reading prose to poetry

9. a enjoy drawing my own images and ideas
   b enjoy copying and filling in details
   c enjoy drawing my own images and copying and filling in equally

10. a believe I would be easily hypnotized
    b could probably be hypnotized but it would be difficult
    c do not believe I could be hypnotized

11. a no preference between mystery stories and action stories
    b prefer action stories
    c prefer mystery stories

12. a like to organize things sequentially--in order
    b like to organize things to show relationship--like by color, size
    c no preference for my organization

13. a good at remembering what I read
    b good at remembering what I hear
    c equally good at remembering what I hear and read

14. a have frequent mood changes
    b have few mood changes
    c almost no mood changes

15. a supersensitive and aware of feelings of others
    b moderately sensitive to feelings of others
    c find it hard to interpret the feelings of others

16. a skilled in communicating with animals
    b moderately good in communicating with animals
    c cannot communicate very well with animals

17. a no preference for cats over dogs or vice versa
    b preference for cats
    c preference for dogs

18. a enjoy clowning around
    b can clown or be serious depending upon the occasion
    c do not enjoy clowning around

19. a frequently somewhat absentminded
    b ocasionally absentminded
    c almost never absentminded

20. a equally valuable to tell stories and to act out stories
    b more valuable to tell stories
    c more valuable to act out stories

21. a can study better while lying down
    b can study better while sitting up straight
    c equal preference for studying while lying down or sitting up straight

22. a can think better while lying down
    b can think better while sitting up straight
    c equal preference for thinking while lying down or sitting up straight

23. a highly responsive to music
    b highly responsive to poetry
    c equally responsive to music and poetry

YOUR STYLE OF LEARNING AND THINKING

INSTRUCTIONS: On the answer sheet provided, describe your style of learning and thinking by blackening the appropriate blanks. Try to describe your strengths and preferences as accurately as possible.

1. a. read for main ideas
   b. read for specific details and facts
   c. read for main ideas and for details and facts equally

2. a. never forget a face
   b. never forget a name
   c. never forget a name or face

3. a. usually learn or remember only those things specifically studied
   b. good memory for details and facts in the environment not specifically studied
   c. have noticed no difference in my abilities in these areas

4. a. no preference between outlining and summarizing readings
   b. preference for outlining over summarizing
   c. preference for summarizing over outlining

5. a. prefer visual approach to the teaching of reading
   b. prefer phonetic approach to the teaching of reading
   c. no preference for visual over phonetic approaches

6. a. perform mental arithmetic using images (i.e., can see the problem in my mind)
   b. perform mental arithmetic using rules
   c. solve simple problems using images but convert difficult ones to language and apply rules.

7. a. would like to write fiction books
   b. would like to write non-fiction books
   c. no preference between writing fiction and non-fiction

8. a. like to read fantasy stories
   b. like to read realistic stories
   c. no preference between fantasy and realistic stories

9. a. equally as much fun to dream as to plan realistically
   b. more fun to dream
   c. more fun to plan realistically

10. a. solve problems logically, rationally
    b. solve problems intuitively
    c. equally skilled in solving problems intuitively and logically

11. a. listen to music or television while reading or studying
    b. must have total quiet in order to read or study
    c. listen to music or television only if reading for enjoyment, not if studying

12. a. have no preference between poetry and prose
    b. prefer reading poetry to prose
    c. prefer reading prose to poetry

13. a. if seeking mental health counseling, would prefer group counseling and sharing of feelings with others
    b. if seeking mental health counseling, would prefer the confidentiality of individual counseling
    c. have no preference for group over individual counseling

14. a. enjoy drawing my own images and ideas
    b. enjoy copying and filling in details
    c. enjoy drawing my own images and copying and filling in equally

15. a. believe I would be easily hypnotized
    b. could probably be hypnotized but it would be difficult
    c. do not believe I could be hypnotized

16. a. just as exciting to me to improve something as to invent something new
    b. more exciting to improve something
    c. more exciting to invent something new

17. a. prefer to learn through free exploration
    b. prefer to learn systematically through ordering and planning
    c. no preference between learning through free exploration and learning through more systematic ways

18. a. no preference between mystery stories and action stories
    b. prefer action stories
    c. prefer mystery stories

19. a. no preference between algebra and geometry
    b. prefer algebra
    c. prefer geometry

20. a. like to organize things sequentially
    b. like to organize things to show relationships
    c. no preference for sequential over relational organization

21. a. skilled in sequencing ideas
    b. skilled in showing relationships among ideas
    c. equally skilled in sequencing and showing relationships

22. a. good at remembering verbal materials
    b. good at tonal memory
    c. equally good at verbal and tonal memory

23. a. paces personal activity to time limits with ease
    b. uses time to organize self and personal activities
    c. has difficulty in pacing personal activities to time limits

24. a. have frequent mood changes
    b. have few mood changes
    c. stable; almost no mood changes

25. a. supersensitive and aware of feelings of others
    b. moderately sensitive to feelings of others
    c. find it hard to interpret the feelings of others

26. a. skilled in communicating with animals
    b. moderately good in communicating with animals
    c. cannot communicate very well with animals

27. a. no preference for cats over dogs or vice versa
    b. preference for cats
    c. preference for dogs

28. a. enjoy clowning around
    b. can clown or be serious depending upon the occasion
    c. do not enjoy clowning around

29. a. conforming or nonconforming depending upon the situation
    b. generally conforming
    c. generally nonconforming

30. a. frequently somewhat absentminded
    b. occasionally absentminded
    c. almost never absentminded

31. a. no preference for well-structured over open-ended assignments
    b. preference for open-ended assignments
    c. preference for well-structured assignments

32. a. when viewing advertisements, am most often influenced by attractive signs, pleasant scenes, and sensual overtones
    b. when viewing advertisements, am most often influenced by the information comparing several products and demonstrating which works the best
    c. primarily influenced by the advertising medium only when accompanied by information on the quality of the product.

33. a. enjoy analyzing stories
    b. enjoy creative storytelling
    c. enjoy equally analyzing stories and creative storytelling

34. a. equally valuable to discuss stories and illustrate them
    b. more valuable to discuss stories read
    c. more valuable to illustrate stories read

35. a. equally valuable to tell stories and to act out stories
    b. more valuable to tell stories
    c. more valuable to act out stories

36. a. moving rhythmically and rhyming are equally enjoyable
    b. moving rhythmically is more fun
    c. rhyming is more fun

37. a. producing ideas and drawing conclusions are equally enjoyable
    b. drawing conclusions is more fun
    c. producing ideas is more fun

38. a. would like to do impromptu interpretative dancing
    b. would like to do ballet dancing
    c. no preference for ballet over impromptu interpretative dancing

39. a. enjoy interacting affectively with others
    b. enjoy interpreting the affective interaction of others
    c. equal preference for affective interaction and interpretation of the affective interaction of others

40. a. strong in recalling verbal materials (names, dates, etc.)
    b. strong in recalling spatial imagery
    c. equally strong in recalling verbal and spatial imagery

41. a. can study better while lying down
    b. can study better while sitting up straight
    c. equal preference for studying while lying down or sitting up straight

42. a. can think better while lying down
    b. can think better while sitting up straight
    c. equal preference for thinking while lying down or sitting up straight

43. a. have general feelings about pictures or objects of art without much attention to details
    b. get greatest pleasure from the beautiful details of a picture or other work of art
    c. must get both a general feeling about a picture or other object of art and a grasp of the details

44. a. highly responsive to music
    b. highly responsive to poetry
    c. equally responsive to music and poetry

45. a. generally attentive to verbal explanations
    b. generally restless during verbal explanations
    c. can control attention during verbal explanations

46. a. when working at a motor task, cannot attend to questions
    b. when working at a motor task, can attend to questions
    c. when writing or reading, cannot attend to questions

47. a. no preference for demonstration over verbal instructions
    b. prefer demonstration
    c. prefer verbal instructions

48. a. expressive emotionally in nonverbal ways
    b. expressive emotionally in verbal ways
    c. expressive emotionally in both verbal and nonverbal ways

49. a. would like to be a music critic
    b. would like to be a music composer
    c. would enjoy equally music criticism and composition

50. a. skilled in the intuitive prediction of outcomes
    b. skilled in the statistical, scientific prediction of outcomes
    c. equally skilled in intuitive and statistical-scientific prediction

SCORING KEY

R=Right Hemisphere L=Left Hemisphere I=Integrated use

1.	R	13.	R	25.	R	37.	I	49.	L
	L		L		I		L		R
	I		I		L		R		I
2.	L	14.	R	26.	R	38.	R	50.	R
	R		L		I		L		L
	I		I		L		I		I
3.	L	15.	R	27.	I	39.	R		
	R		I		L		L		
	I		L		R		I		
4.	I	16.	I	28.	R	40.	L		
	L		L		I		R		
	R		R		L		I		
5.	R	17.	R	29.	I	41.	R		
	L		L		L		L		
	I		I		R		I		
6.	R	18.	I	30.	R	42.	R		
	L		L		I		L		
	I		R		L		I		
7.	R	19.	I	31.	I	43.	R		
	L		L		R		L		
	I		R		L		I		
8.	R	20.	L	32.	R	44.	R		
	L		R		L		L		
	I		I		I		I		
9.	I	21.	L	33.	L	45.	L		
	R		R		R		R		
	L		I		I		I		
10.	L	22.	L	34.	I	46.	R		
	R		R		L		L		
	I		I		R		I		
11.	R	23.	I	35.	I	47.	I		
	L		L		L		R		
	I		R		R		L		
12.	I	24.	R	36.	I	48.	R		
	R		I		R		L		
	L		L		L		I		

Lesson 7

THE HEMISPHERES

Note: If time did not permit the use of "Your Style of Learning and Thinking" in the previous session, begin this day with the inventory.

Now that the students have discovered their possible brain preference, an indepth review of the functions of each sphere is appropriate. While it is suggested that each student receive a copy of the following list, the teacher will want to give examples of selected characteristics. Which functions to be emphasized are left up to the discretion of the teacher.

Students can effectively become involved by actually "doing" that type of thinking. For example, solving a problem of logic will help emphasize that "right now" their left brain is being used. Holding up a picture of a famous or known person and asking the students to identify that face is use of the right brain. Simply asking, who was Martin Luther King will evoke a left brain response. The examples are endless, therefore, it is recommended the teacher prepare at least ten activities per side. Suggestions for some have been provided on the second duplicate hemipshere sheet.

This activity also lends itself to a student assignment. Each person or a pair might be assigned two or three functions to demonstrate, direct or instruct. For younger students, a dictionary is a must. In order to demonstrate kinesthetic instruction, the term must be defined. Since most students will enjoy this type of activity, the teacher may want to provide bulletin board space, room for student created learning centers, displays, listening areas, etc. for the children to expand their horizons and present challenges to other classmates.

RIGHT BRAIN AND LEFT BRAIN FUNCTIONS IN TERMS OF STYLES OF LEARNING AND THINKING

By E. Paul Torrance

Right Hemisphere Functions	Left Hemisphere Functions
creative thinking	critical thinking
intuitive thinking	logical thinking
synthesis	analysis
divergent thinking	convergent thinking
diffuse thinking	focal thinking
holistic/Gestalten	parts/segmented
simultaneity	sequential
non-linear	linear
visuo-spatial	verbal
recognizing/remembering faces	recognizing/remembering names
responding to visual/kinesthetic instructions	responding to verbal instructions
responding to emotion/feeling	responding to logical/verbal
playful/loose in experimenting	controlled/systematic in experimenting
humorous ideas	serious, logical ideas
subjective processing of information	objective processing of information
likes improvising	dislikes improvising
use of metaphors and analogies	little use of metaphors and analogies
self acting	receptive
geometric	algebraic
geometric organization	mathematical reasoning
simple math computation	abstract math computation
relational concepts	sequencing of concepts
spatial orientation, directionality, spatial localization	verbal syntax
symbolic aspects	grammatic logic
tonal qualities, tonal patterns	analysis of speech sound, syllable recognition
tonal memory	verbal memory
musical hearing, melody, etc.	phonics
singing (pitch, rhythm, intonation, lyrics)	writing
drawing, model building	action words, movement of hands in speech
random exploration	ordering and sequencing
spatial exploration	verbal exploration
dreaming	planning (sequence)
assuming	verifying
imagination	duplication and application
fantasy	reality
inventing	improving known
fiction	non-fiction
affective interaction	interpreting behavior
visualized reading	word reading
visual approach to reading	phonetic approach to reading
summarizing	outlining
(show how to. . .)	(tell how to . . .)

RIGHT BRAIN AND LEFT BRAIN FUNCTIONS IN TERMS OF STYLES OF LEARNING AND THINKING
By E. Paul Torrance

Right Hemisphere Functions

creative thinking
intuitive thinking
synthesis (propose a new course to be offered at school)
divergent thinking (list problems that have the result of four i.e., 1 + 3 or three pigs plus the wolf)
diffuse thinking
holistic/Gestalten
simultaneity
non-linear
visuo-spatial (draw a house with depth)
recognizing/remembering faces
responding to visual/kinesthetic instructions
responding to emotion/feeling (how would you feel if you had won $6,000?
playful/loose in experimenting
humorous ideas
subjective processing of information
likes improvising
use of metaphors and analogies
self acting
geometric (identify geometric shapes)
geometric organization
simple math computation (1 + 1= ?)
relational concepts (how is a tree like a dandelion)
spatial orientation, directionality, spatial localization
symbolic aspects (what does the symbol $ mean)
tonal qualities, tonal patterns
tonal memory
musical hearing, melody, etc. (Play a song)
singing (pitch, rhythm, intonation, lyrics)(sing Row Row Row Your Boat)
drawing, model building (design/draw a tree house)
random exploration
spatial exploration
dreaming (everybody daydream now--have a sharing session)
assuming
imagination (It's the year 2150 and you've landed on the planet Zeph. What is it like?)
fantasy (If I could be famous, it would be for . . .)
inventing
fiction (list your favorite fiction story)
affective interaction
visualized reading
visual approach to reading
summarizing
(show how to . . .)

RIGHT BRAIN AND LEFT BRAIN FUNCTIONS IN TERMS OF STYLES OF LEARNING AND THINKING
By E. Paul Torrance

Left Hemisphere Functions

critical thinking
logical thinking (teacher should locate an example)
analysis
convergent thinking (S+M+T+W+T+F+S=W)
(days of week = one week
focal thinking
parts/segmented
sequential (What is the next number in this series 1,3,5,7, 9 . . .)
linear
verbal
recognizing/remembering names
responding to verbal instructions (Jill, close the door)
responding to logical/verbal
controlled/systematic in experimenting
serious, logical ideas (law of gravity)
objective processing of information
dislikes improvising
little use of metaphors and analogies
receptive
algebraic
mathematical reasoning
abstract math computation (area = πr^2)
sequencing of concepts
verbal
syntax
grammatic logic (he was or he were)
analysis of speech sounds, syllable recognition
verbal memory (recite Mary Had a Little Lamb)
phonics (st sl sp use a word with each)
writing (write your name on a piece of paper)
action words, movement of hands in speech (Use your hands to demonstrate shifting a car)
ordering and sequencing (review the events in a fairy tale)
verbal exploration
planning (sequence) (plan a trip to Florida)
verifying
duplication and application
reality
improving known
non-fiction
interpreting behavior
word reading
phonetic approach to reading
outlining
(tell how to . . .)

Lesson 8

THE SENSES . . . RECEPTORS OF THE BRAIN

By fifth grade, I am assuming that the students have knowledge and basic comprehension of the five major senses, therefore, this is not a lesson of location, anatomy, or physiology. Certainly, a short review may be appropriate, however, the main objective is to study the senses as receivers, retrievers, and senders of information to the brain. For it is the brain that interprets, records, and reacts to this sensory bombardment. Bombardment it is, as every second the brain receives over 10,000 stimuli. For the reason of maintaining sanity, the brain, with computer like speed, sorts through the messages and will appropriately deal with this massive collection of data. Most stimuli are stored in the unconscious brain, others may be stored in the short-term memory section, others in the long-term area. Only those of immediate importance are acted upon. Obviously, we are not aware of the majority of the stimuli, nonetheless, the sensory organs are actively doing their job. The magnificence of it all is the brain, the organism, is in total command.

The senses are extremely specialized with each having its own range and sensitivity to external stimuli. For example, the eye responds to light, the ear to sound, touch to texture and pressure. The most efficient and informative sense becomes our dominant mode for knowing the world. For sighted people, vision is the dominant sense. In order for sighted students to understand the important role of this sense, an experiment in deprivation is meaningful. The following is only a suggested procedure of which the teacher may wish to alter.

Divide the class into teams of two. One blindfold per team will be needed. Then select two rooms the children are unfamiliar with such as, the janitor's room, principal's office, staff lounge, or another classroom--perhaps of a resource teacher that few children will know. Every school seems to have a few nooks and crannies that the children rarely see, however, if yours does not, perhaps a walk outside will serve the purpose. One person of each team will be blindfolded and the second will act as a safety guide. Students will be instructed to try to form a mental image of the room and its contents without the use of their sight. Specifics should be stressed such as awareness of space, walls, cupboards, cabinets, desks, knick knacks, etc. After the tour of the room, the safety guide should bring the partner back to the homeroom where the blindfolds are removed and the "blind" student sketches a diagram of the room. Based upon the memory's storage system, additional details may be written. For example, "I heard a ticking up high so there may have been a clock on the wall." "I felt a breeze and heard a

hum which sounded like an air conditioner." I felt a breeze so there probably was an open window." ETC. (Since the sighted guide student will see the one room, it is important that two locations are selected so the team can switch roles.) After both students have completed their sketches and comments, they should return to their respective rooms to compare and analyze their perceptions. Their reactions, fears, emotions, and analyses will be the basis of an enlightening class discussion.

Activities in hearing and listening will be helpful to stress the significance of this sense. First, instruct the students to write down all the sounds they hear within and outside of the classroom while they are all sitting quietly. No talking by the class is essential. A short time of perhaps two minutes is all that is needed to compile a list. Share the sounds that were heard.

Previous to this session, the teacher may want to tape "sounds of our school" and have the students try to identify the cause of the sound. A few suggestions of sounds to tape are a pencil being sharpened, writing with chalk, closing a door, opening a desk, pulling down a shade, moving a chair, using the light switch, starting a film projector, etc. As a further activity, I have had students make their own tape of sounds based on a theme, for example, sounds in the kitchen, in the gym, outside, or sounds of cooking. Some students chose to set up a screen and produce the sounds live.

The hearing activities should serve to emphasize that the amount of auditorial sensations our brain receives is large and that the brain efficiently identifies, sorts, and reacts.

Lesson 9

THE SENSES, CONCLUSION--MEMORY THE LONG AND SHORT

The final experiment deals with the senses of taste and smell. Since we all seem to enjoy eating, a sufficient quantity of food items will be necessary. Provide enough pieces of apple, celery, onion and carrots (or whatever foods you prefer but they must be of similar texture). Using teams again, half of the students are blindfolded and will be fed a piece of each food, however, they must pinch their nose shut so they cannot smell. The partner then gives the mate one piece at a time and asks the taster to identify whether it is a piece of apple, celery, onion or carrot. The feeder should record the actual food and the taster's responses. After this first "lunch" time, the two students switch roles, then follow the same procedure. I would suggest that all teams should follow the same order of giving the food, therefore, the teacher may want to prepare cue cards of each food item for the feeders to follow. This way the tasters will not hear what is being served. When starting the second round, the teacher should vary the order so the initial feeder-now-taster will not try to second guess the identity of the food. If the students do not smell the food, there should be some interesting results to compare and discuss. The students will realize that taste relies on smell, however, remind them that smell works independently, too. One strong whiff, and we all can smell the presence of a skunk!

There are numerous experiments that can be used to achieve the same end. The senses are of vital importance to the brain but must be viewed as only stimuli collectors. It is the brain that perceives the world. The ear can hear the sounds of a piano, but only the brain can recognize Beethoven's Fifth Symphony and appreciate the artistry of this genius. The eye can see the colors of a sunset, but the mind is in awe of the beauty.

In closing this session, you may want to have each student write statements similar to the previous two. I believe the children will truly feel the magnificence of the brain by writing their own statements.

MEMORY, THE SHORT AND LONG

The brain's ability to remember is both fascinating and mysterious. Although scientists have identified which portions of the mind seem to store memories, the exact physical causation of this phenomena is still being explored. This session will deal only with the basics of short and long term memory systems and will not go into the specifics of learning, such as language, recognition of faces, relationships, etc. The objective of this lesson is for the student to become aware of the phenomena of memory. Some children may want to research memory in greater detail.

The short term memory stores information that will be needed only for a brief period of time. When the need is no longer, the material is forgotten or passed out of the system to make room for new data. Where used information actually goes is unknown. Perhaps, it is stored within the realm of the unconscious mind or perhaps the physical chemical-electrical energy that retained the data is spent or used, therefore, the image is no longer within the mind. The important feature is need. When the need for remembering is gone, the detail is removed. Sometimes the mind realizes that this need is greater than the storage capacity of the short term. At this point, the item will be transferred to the long term system.

The long term memory seems to also operate in a time mode. Certain impressions from our life experiences are coded into the long term forever. Obviously, these are the most significant and represent momentus occassions such as extremely happy celebrations, perhaps accidents, deaths, a special experience in school, a friend we once knew who has since left our life, etc. Often these types of memories are related to a strong emotion. The joy or the scar can each etch a lasting impression of details of the event. Some of these types of messages seem to be the result of a comparatively long process. A longer period of time is needed to establish the memory. For example, class reunions serve as a stimulus to the memory of those who were in your class. Being with these same people for many years builds a long term, long time memory of classmates.

Perhaps an effective way for students to become aware of their memory systems is to experience the recall of memories. The exercises will begin with short term.

A. The teacher will state a telephone number, 423-4185, and ask the students to repeat what they have heard. At the end of the class session, again ask the students for the phone number, however do not give it to them the second time. Observe how many students can repeat the number the first time compared to those the second time.

B. Ask the students to recall what they ate for supper three days before. Some students may remember due to a significant relationship such as, a family birthday or they ate at a restaurant or they prepared the meal so are more apt to remember.

C. Ask them to name five people they have talked to today.

D. Ask the students what clothing they wore to school yesterday. Since this should be relatively easy, compare the results by asking them what they wore to school two weeks or a month ago.

Long Term Memory

A. List all your homeroom teachers from kindergarten through third grade. Do you remember the homeroom numbers? Most will recall the teacher since that was fairly significant, however, few will have stored the data of all the room numbers.

B. Recall a time you were hurt before age five. Compare these experiences with classmates and observe significant information i.e., We were in a car accident, I was learning to ride my bike, etc.

C. Describe one of your favorite Christmas or birthday presents you received before the age five.

D. For those that have moved within the past five years, try to recall your old address(es) and/or phone number(s).

E. Recall both an extremely happy and sad event. The class should analyze possible reasons for these memories to be stored in the long term system.

End this session with the students responding either orally or in writing to this question: What past, present, or future events in your life do you think you'll probably remember forever?

Lesson 10

"Reflections of Minds"

The purpose of this session is to emphasize the uniqueness of the human species due to its greater development of the magnificent, beautiful brain. Students need to be aware of the positive potential of each individual and of the human race collectively. Even though we live with war, despair, starvation, abuse, the human spirit is strong; and the human mind is capable of providing solutions to the many problems it also has a part in creating. The emphasis is on the positive for I believe our youth need to understand and appreciate the gift of their minds. However, this alone is not enough. The next inevitable step is to use their minds, spirit and strength to improve the present and future conditions. With this philosophy as the basis, the following quotations can serve as the formation of a class discussion. The teacher is encouraged to find other remarks and develop other questions. Also, be alert to the students' need of side-tracking as the discussion ensues. There is the option of giving the quotes to the students prior to this session. This allowance of time for thought may enhance the responses of the children. Also, the children should be encouraged to develop and present their own questions and quotes for discussion. Perhaps small group brainstorming sessions will be helpful.

Before the discussion of each remark, assign students to research the person quoted giving a brief biographical statement information reflecting philosophy and the meaning of the remark.

"Thinking is like loving and dying, each of us must do it for himself."
-Josiah Royce-

"Thinking is the talking of the soul with itself."
-Plato-

"Where there is an open mind, there will always be a frontier."
-Charles F. Kettering-

"An interest in the brain requires no justification other than a curiousity to know why we are here, what we are doing here, and where we are going."
-Paul McLean-

(This last remark lends itself to further discussion of the future capability of the mind. For example, what new functions might exist in the mind in the year 5,000?)

Student response to the following thought culminates this unit: What my brain means to me . . . An essay is appropriate.

Administer the post test.

EXTENDED LEARNING ACTIVITIES FOR TALENTED AND GIFTED STUDENTS

The following extended activities are intended to provide challenges for the potentially talented and gifted children in the classroom. Although developed for the academically and intellectually gifted students, various changes and adaptations could be made to meet the needs of the creatively gifted child.

Most of the projects and products require higher level thinking based on Benjamin Bloom's taxonomy of cognitive and divergent thought processes. I deliberately included questions on the knowledge-comprehension levels in order to provide for a comfortable, successful learning environment. Since performing at higher levels might be a newer experience for some gifted students, it is important they do not become frustrated during the initial phases of their explorations. Knowing your students will help you and the children determine where to begin.

The ten diverse topics hopefully will stimulate the varied interests of the students. I encourage you and the children to modify these ideas if desired, however, please continue to include a product or mode for sharing the research. For it is the product that often emphasizes the purpose or reason for completing the assignment.

I hope the children will learn and will enjoy pursuing these challenging options. Ultimately, I encourage them all to continue seeking new knowledge about their beautiful brain.

Teacher center

SLEEP

** Name and define the four main levels of sleep. It might be "all Greek" to you at first, but you'll recognize these patterns in your sleep habits. Present your findings on a chart.

** Select three mornings in a week to record your recollections of your passage through the sleep stages. Since you know you'll be doing this, your brain should be more aware of what is happening and so you should have a fairly good recall of your mental activity. If you do remember some dreams, give a brief summary of each. Pay attention to any emotional responses, too. Write a narrative of each night. Look for patterns, causes and effects of your thought both conscious and unconscious (dream). Encourage some friends, classmates, or family members to share this experience. Compare your results and findings with theirs and share these in your narrative review.

** Prepare a questionnaire to be distributed at school among students and the adult staff. Gather data concerning regular times people go to bed and arise in the morning. You might also want to ask if naps are taken, when and for how long. Prepare a graph and chart the results. Consider such factors as age, grade and sex. Display your findings by preparing a bulletin board or interest center.

** Survey at least fifteen people who have difficulties in getting to sleep at night. Inquire what methods they use to induce sleep. Try to include people of varying ages. Analyze the findings for comparisons or unique solutions to their sleep problem. Summarize and share your results by writing a newspaper or magazine article.

Teacher Center

PREHISTORIC BRAIN SIZES

** Research these four groups with the purpose of comparing their lifestyles, basic needs and brain sizes to us, Homo Sapiens. Prepare a timeline showing the progression and the comparisons. Based on your findings, draw conclusions about the general intellectual ability of each group. Set up an illustrated learning station for your classroom or media center.

Neanderthal
Cromagnon
Australopithecus
Java

** Based on what you have learned about the brain, write an essay about functions of the brain that probably didn't exist in prehistoric people that are present in the realm of our capabilities. You will want to narrow this topic. Some ideas are food gathering-growing-preparation, art, hunting, language, families, or shelters.

** Many of the early groups of people and some that exist today, depend entirely on the natural environment for all their resources. Complete one of the activities listed below. Hopefully, you will appreciate the mental and physical difficulties of this lifestyle.

a. Prepare a feast of foods totally found in the natural environment. No snitching from gardens! Consult your media center for helpful books. Share samples of the meal with your class.

b. Prepare a shelter. Bring the materials to school and construct it on school property. Observe the effects of weather as you might have to reconstruct. Be sure to ask permission and suggestions for location.

c. Make a weapon or useful tool out of natural resources; no knives, nails or string!! Challenge your friends to do the same task.

** Based on your knowledge of human brain changes, growth and development, what specific functions might we see evolve, change, become weaker or stronger in the distant future of mankind? Write an essay of your predictions.

DREAMS

** Explain the difference between dreams and nightmares. Try to recall at least three nightmares. Summarize each dream in one sentence. Ask your friends about their nightmares. Take notes and compare them to your experiences. Identify common themes, for example, being chased. Prepare an eye catching, informative bulletin board of your results.

** You're a poor soul suffering from somnabulism. What's wrong with you? Describe a real experience either you have had or someone you know has had with somnabulism. Did you or they remember if the activity blended into a dream? What effect, if any, did emotions and real life experiences have on you or others? Use your literary talents and write a short story about somnabulism based on your findings.

** While everyone dreams, some people never seem to recall their dreams. Also, more females than males tend to dream in color. Furthermore, some reports say that many people omit favorite pets from their dreams. Survey your classmates, possibly your whole school, to find out information on these three issues. You might also want to include questions of your choice. Analyze the results and prepare a report of your poll to be shared with the entire school.

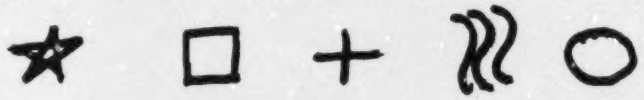
** Most dreams are based on one of two factors: 1) Dreams may be related to the events of the day previous to the dream and 2) dreams may be a reflection of strong wishes of the dreamer. If you are a person who recalls dreams, keep a daily log of your dreams for ten days. If a dream relates to somethink you did, label it type 1. If it relates to a wish, label it type 2. (You might want to jot down a phrase to help you remember the dream.) Compare your results after the ten day period. Did you have more type 1 or 2? Which did you recall more vividly? Were any nightmares? If so, which ones? Were you younger in any dreams? Were these type 1 or 2? Share your results in a narrative or on a cassette tape. Present to your class.

Teacher Color

EXTRA SENSORY PERCEPTION

** There are three recognized types of E.S.P. They are telepathy, clairvoyance, and precognition. Demonstrate the meanings and differences to your class.

** Choose a partner and participate in the following test of your telepathic powers. You'll need twenty five index cards. Draw each of the symbols on five separate cards. You will have five cards with a star, five with a square, etc. Use this deck of E.S.P. cards to do the experiment. Choose a cool, quiet



comfortable room where you can relax. Sit in a soft chair with a table or card table in front of you. Your partner should be in a separate room with the shuffled deck of cards. Totally relax your mind and body. When you are ready, signal your partner and have him/her pick the top card and concentrate on the image. When you "sense" the image, call out its shape. Without responding, your partner should record your answer and the symbol on the card. Go through the entire deck. You may want to run through the deck several times. Then switch with your partner.

To evaluate the number of "hits" or correct responses, consult the following chart. The evaluation column indicates the law of chance.

Hits	Odds	Evaluation
0-3	20-1	Strong negative ESP
5	Even	Chance
6	10-1	Indecisive
7	30-1	Good
8	125-1	Excellent
9	400-1	Very Strong

*This experiment is from the book by W. R. Akins, ESP; Your Powers and How to Test Them. Franklin Watts, 1980.

Demonstrate the experiment to your class. Since many of them will also want to test their E.S.P., you might want to prepare several decks of the cards.

** People with special mental powers have at times been called to assist in detective work. Some families of missing persons will contact people known for their clairvoyance to help locate a loved one. Contact your local public library or police station and try to find one or two cases. If your police department has been involved in such situations, interview an officer about the happenings. If you can locate the name and address of a person known for their powers, write a letter to them. Ask polite questions about their special ability. Be sure to include a stamped, self-addressed envelope for a return letter. Share the information in a written article for your local newspaper.

ANIMAL BRAIN SIZE

** Choose twenty animals, birds and/or reptiles and compare their brain weight to that of their average adult total body weight. Gather the information and chart your findings from lowest to highest percentage of brain weight.

** Television personalities Johnny Carson and Ed McMahon have had a long standing debate as to which is "smarter", the pig or the horse. Your task is to decide what criteria should be used to evaluate these two animals. After researching and gathering information, write an essay defending your choice. You might wish to send a copy of your findings and opinion to Johnny Carson.

** Recent developments in work with monkeys has led to the educating of some primates in the field of communicating with signals and sign language. One such experiment has been written up in a book about the monkey Nim. Other monkeys have been further trained to serve as the seeing eyes for blind people. Choose one of these areas of research and develop a presentation of your findings. Be creative in your search for resources. Any local associations of the blind might provide you with excellent information. If you choose the other example, search for books, films, magazine articles and newspaper reports that have been written on these "talkative" monkeys. You can present your findings in many ways. Perhaps a class session, display, learning center, bulletin board, or newspaper article may be to your liking.

BIOCHEMISTRY OF EMOTIONS

Biochemistry of emotions refers to research dealing with the body's physical reactions due to an emotional cause. The mind is capable of expressing so many feelings. Sometimes these physical reactions feel good, while other times they may hurt, actually hurt some part of the body. By involving yourself in the following activities, you should learn to recognize the concept of the biochemistry of emotions.

** What is stress and what are some of the causes? Explain ways stress can be eased. Discuss stressful situations for your age group. Prepare an illustrated booklet that gives insight into stress. Have copies made and definitely share with your peers.

** Tears are shed for many reasons. Conduct a survey of at least twenty people and find out what feelings/emotions cause tears. Analyze your data and add your own experiences. Present your findings in the form of an article. Submit your written work for publication by your school newspaper, local paper, the magazine, Chart Your Own Course, etc. Your teacher will be able to give you other suggestions for publishing sources.

** Think of humorous situations, in varying degrees. Describe what happens to your body when you hear a joke, tease a friend, get involved in a humorous situation or even get to the point where "it hurts when you laugh". Review the effects of at least three humorous situations. Consult others. Also, explain what physical responses occur during laughter. *Notice what you do when you laugh really hard. Write and produce a filmstrip on humor. Select a talented artist to help with the illustrations.

** If you have ever lost a loved one through death, moving, the break-up of a boy/girl friendship, or even the departure or death of a pet, you probably felt an ache near your heart, the proverbial "heartache". Research this phenomena and discover why this part of the body might, indeed, ache. Share your findings in an oral report. You might want to include a poem as the loss of love is a topic written about by many poets.

THE SENSES

** Research two of the following and with other classmates, participate in a round table discussion presenting your findings.

Do blind people dream?

What is tickle and why are there varying degrees of sensitivity?

What different kinds of vision are present in animals, reptiles, amphibians, and fishes?

Identify fifteen devices available to aid the hearing impaired.

What would be the effects on a person if they were placed alone in a dark, sound-proofed room for at least one hour?

Name forty occupations that a color-blind person would not be able to hold.

THE CREATIVE, INVENTIVE MIND

** Most of our modern technological devices are not the brainchild of one person but rather the accumulated efforts of many creative, inventive minds. Select one of the following inventions or choose your own. Research and trace its development. Make a list of all the men and women whose efforts together resulted in the development of the unit. Be creative in your search for informative resources.

television	video recorder	stereo headphones
cassette recorder	camera	toaster
transistor radio	blender	hair dryer
digital watch	microwave	dishwasher

If you choose one of the above, you have the freedom of selecting a particular type, style, and degree of complexity. Prepare a classroom display to show your findings.

** Create a new invention to help the blind, hearing impaired or physically handicapped. You may describe the mechanism, sketch it or actually construct a model. Show your results to a physician or a person who works with the handicapped. Ask for suggestions and ideas for modification. You may want to pursue your idea with companies who manufacture products for the handicapped.

** Perhaps one of the best ways to begin to understand the inventor's mind is by interviewing an inventor. Use your creative mind and with the help of other people, locate an inventor. If you're not able to arrange a personal interview, consider calling or writing for responses of questions developed by you. Share your knowledge of the person, the inventions and the method of creating with others. If possible, arrange for the inventor to visit your class.

DISEASES AND ILLNESSES OF THE MIND

** What is meant by psychosomatic illnesses? What might be some of the causes and some of the results? Is there a relationship between hypochondria and psychosomatic illness? Prepare a scientific article discussing your findings.

** Choose three of the following illnesses and research the nature, possible causes, effects and methods of treatment.

Psychosis	neurosis	encephalitis
stress	aphasia	myasthenia gravis
depression	epilepsy	tardive dyskinesia

Write and illustrate an informative pamphlet for each illness.

** There have been several noted cases of extreme schizophrenia where people have actually experienced living several different personalities. Both Sybil and The Three Faces of Eve are case studies which have been written into books. While reading one of these or researching other cases, keep a diary of your thoughts, feelings and reactions to this mysterious illness and its effects on a person.

** What is an encephalograph? Contact a physician and ask about the use of this test and what it can reveal about the brain. If possible, arrange a visit to a clinic or hospital and have the physician show you an encephalograph. Share your experiences with your class in the form of an oral report.

PHOBIAS-FEARS OF THE MIND

** Make a dictionary defining at least thirty kinds of phobias. Share with your class, then have it displayed in the media center. You might want to add illustrations.

** Survey at least thirty people and record their types of fears or phobias. Prepare a chart with the appropriate phobia names. Indicate what percentage of people responded to that phobia. Then consult a psychiatrist, psychologist or physician and find out what are the five most common phobias. Report the findings to your class.

** Research and discuss methods used to overcome phobias. Consult the medical profession for your information. Tape your report, share it with your class, and give a copy of it to the media center.

STUDENT EVALUATION OF THE EXTENDED LEARNING UNITS

1. What topic(s) appealed to you the most and why?

2. What difficulties in researching did you encounter?

3. What references or books did you use that were new to you?

4. Did you enjoy the opportunity to further the study of the brain? Why or why not?

5. With whom did you share the products, activities, and experiments?

6. What additional topics could be added to this group? (Your suggestions are very important and will serve as the basis of new units!)

7. Any additional comments you would like to make?

TEACHER EVALUATION OF THE UNIT

1. Please remark about the overall effectiveness of the unit.

2. What seemed to be the most difficult area for the students to understand?

3. What aspects of the unit were most enjoyable for the students?

4. What sessions needed to be further explained or researched by yourself before you could present the lesson?

5. How helpful were the narratives preceding the student activities?

6. Was too much or not enough material provided for each session? Please respond to the pacing and organization of the material.

7. How did you select students for the extended learning activities?

8. What observations did you make about the challenge, interest, and higher level thinking aspects of these extenders?

9. Were the extended units worthwhile?

10. What additional topics would you suggest for development in the extended learning unit?

11. Do you think you will teach this unit again?

12. Using your system of evaluation, how would you rate this unit?

13. Additional comments you would like to make. . .

Send to: Nancy Struve
Lincoln Elementary
Waterloo Comm. Schools

MEDIOGRAPHY OF AEA 7 MATERIALS

Previewing media before use is always recommended.

16mm Film

*	Numerous items on the senses
3553	Gateways to the mind
3789	Sense perception
9841	Senses and perception links to the outside
2612	Your amazing mind
3820	Memory
20005	PSI-Boundaries of the mind
30003	Mysteries of the Mind

Curriculum Lab Materials

Sc234	Understanding the human brain
Sc214	The great brain

Small Media

6957	Exploring the brain
6887	Psychic phenomena

Teachers are urged to continue this mediography as new materials are released.

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